Remarks/Arguments

With entry of the foregoing amendments, claims 1, 5-6, 13, 14, 16-22, 43, 50 and 52-63 are pending in the application. Claims 1, 43, 50 and 55 have been amended to indicate that the method produces mature embryos capable of germination and to limit the types of embryos covered by each claim to closely match the examples. Support for these amendments can be found in the specification at least at page 3, lines 19-25 and throughout the Examples section. Claims 61-63 are newly added. Support for these claims can be found at least in Examples 6-10 of the application. Claims 5, 7, 8, 9, 23, 27, 28, 33, 34, 36-42 and 51 have been cancelled.

Applicants thank the Examiner for withdrawal of several rejections. Applicants respectfully request reconsideration and allowance of the claims in light of the amendments and the arguments presented below.

Rejections Under 35 U.S.C. § 103(a)

Claims 1, 5-9, 13-14, 16-23, 27, 28, 33-34, and 36-43 were rejected as unpatentable over Handley (U.S. Patent No. 5,491,090) in view of Schuller (Plant Cell 60:23-31 (2000)) and further in view of Find (U.S. Patent No. 6,897,065). The Examiner contends that Handley teaches a method of regenerating *Pinus taeda* using an induction medium and a maintenance medium comprising glucose, maltose, sucrose, melezitose and a combination thereof. The Examiner acknowledges that Handley does not teach or suggest use of lactose. The Examiner alleges that Schuller teaches use of lactose in the prematuration medium and use of a combination of lactose and sucrose in the maturation medium of *Abies Alba* embryos and that Find teaches that suitable carbon sources for maturation include sucrose, maltose, lactose,

fructose, glucose, maltotriose, starch, galactose, etc. The Examiner then argues that it would have been obvious to one of skill in the art to use a combination of sugars, including lactose in the induction, maintenance, or prematuration medium. The Examiner also states that those skilled in the art would be motivated to combine the references because conifers are an important timber crop.

The combination of these references does not teach or suggest each element of claims 1 or 43 or any claim dependent therefrom. Specifically, none of the references teach or suggest use of lactose and an additional sugar in an induction, maintenance or prematuration media for *Pinus taeda* somatic embryogenesis. Handley mentions several sugars as useful in the culture of somatic embryos, but does not mention galactose-containing sugars or lactose at all. The absence of galactose-containing sugars or lactose from Handley supports the position that it was not obvious to use lactose and an additional sugar during any of induction, maintenance or prematuration. Handley only mentions use of combinations of sugars, but does not exemplify any particular combinations.

The Examiner then combines Handley with Find. Find teaches use of lactose in the maturation step of somatic embryogenesis, not in induction, maintenance or prematuration. The Examiner argues that a demonstration of use of a carbon source during one phase of growth is equivalent to use of that sugar for any purpose even if the cellular process involved is completely unrelated. As detailed in the declarations submitted with the last response, those skilled in the art would expect the media used during different phases of growth to be different. See Fowke Declaration at 9 and Attree Declaration at 8. Thus, Find's teaching of the use of lactose in

maturation media would not combine with Handley to teach the elements of the claim because Handley does not teach use of lactose in induction, maintenance or prematuration media.

The Examiner then combines Handley and Find with the teachings of Schuller. Schuller teaches a nutrient medium for use in *Abies alba*. As noted in the specification at page 7, lines 12-15, *Abies alba* has distinct growth requirements from other conifers. Thus, one skilled in the art would not look to *Abies alba* somatic embryogenesis for direction on *Pinus taeda* somatic embryogenesis. In addition, the results of Schuller demonstrate that in most cases no late cotyledonary stage embryos were obtained and Schuller is silent as to whether any of the embryos were capable of germination as required in the instant claims.

As noted in the Declarations of Attree and Fowke submitted with the last response, the number of mature somatic embryos capable of germination obtained using the methods claimed herein were surprising and unexpected. See Attree Declaration at 12-13 and Fowke Declaration at 11. These results were demonstrated in the Examples. This represents a significant improvement in the field because maintenance and bulk-up of tissues is a large expense and by generating higher numbers of embryos per gram of tissue the costs of somatic embryogenesis can be decreased significantly. The unexpected benefits of using a lactose as compared to other more traditionally used sugars were noted in the specification at least at page 6, lines 23-25 and page 8, lines 15-21 and are noted in the Declarations of Attree and Fowke.

The Examiner's reliance on the fact that conifers are an important timber crop to provide motivation to combine these references is misplaced. This fact only provides motivation to experiment in this general area. In fact, this same statement could be made about any commercially relevant technology. This requirement was recently reiterated by the Supreme

Court which stated that: "rejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.'" *KSR v. Teleflex*, 82 USPQ2d at 1396 quoting *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006). The Examiner has not provided adequate rationale for combining these references.

Therefore, the combination of Handley, Schuller and Find does not render claim 1 or 43 obvious. The references combined do not teach or suggest nutrient medium comprising lactose and an additional sugar capable of allowing the development of mature *Pinus taeda* or *Pseudotsuga menziesii* embryos capable of germination as required in claims 1 and 43. Claims 5-6, 13-14, and 16-22 all depend from claim 1 and are not obvious over the combination of Handley, Schuller and Find for at least the same reasons as stated for claims 1 and 43. Applicants respectfully request that the rejection be withdrawn.

Claims 50-54 were rejected under 35 U.S.C. § 103(a) as unpatentable over Handley in view of Fan (U.S. Patent No. 6,689,609). The Examiner withdrew the earlier rejection of these same claims by Fan in view of Handley. The Examiner contends that it would have been obvious to combine the teachings of Handley, which teaches media for use in liquid suspension cultures of somatic embryos, with Fan, which teaches use of lactose during germination, to arrive at the claimed invention. The Examiner states that it would have been obvious to try lactose in early stages of embryogenesis because it had been used on mature embryos and that choice of sugar source in media is a choice of experimental design.

Neither of the references teach or suggest use of lactose in an induction, maintenance or prematuration media for *Pinus taeda* somatic embryogenesis. Handley mentions several sugars as useful in culture of somatic embryos, but does not mention lactose at all. The absence of lactose from the list of sugars provided in Handley supports the position that it was not obvious to use lactose during any of induction, maintenance or prematuration. Fan does not supplement this deficiency. Fan relates to germination, not induction, maintenance or prematuration. As discussed above, and as noted in the Declarations submitted with the last response, those skilled in the art would expect the media used during different phases of growth to be different. See Fowke Declaration at 9 and Attree Declaration at 8. Thus, Fan's teaching of the use of lactose in germination media can not be combine with Handley, which does not teach use of lactose at all, to teach the elements of the claim.

Applicants respectfully assert that the choice of lactose was not merely an experimental design choice. As demonstrated in the examples section of the present application, the selection of carbon sources at each step of the somatic embryogenesis process leads to very different results. Consider, for example, the results in Table 5 of the specification at page 16, which demonstrate that when lactose was used as the carbon source during maintenance and prematuration of loblolly pine somatic embryos, the number of mature somatic embryos per gram of total tissue was increased 10 to 100 fold over sucrose or maltose. This surprising improvement was unpredictable and unexpected in light of the teachings of Handley and Fan and the claims are commensurate in scope with this finding. Applicants respectfully request withdrawal of the rejection and allowance of the claims.

Claims 55-60 were rejected under 35 U.S.C. § 103(a) as unpatentable over Handley in view of Pullman (U.S. Patent No. 6,492,174). The Examiner alleges that Handley teaches use of a combination of sugars in maintenance and prematuration media. The Examiner acknowledges that Handley does not teach use of a galactose-containing sugar. The Examiner alleges that Pullman teaches initiation of *Pseudotsuga menziesii* and *Pinus radiata* embryogenic cultures in media containing 1-1.5% maltose, glucose, fructose, sucrose, galactose or a combination thereof. The Examiner then alleges that it would have been obvious to one of skill in the art to reproduce coniferous somatic embryos in maintenance or prematuration medium containing two sugars as taught by Handley and to modify the sugars by using galactose as the primary sugar as taught by Pullman. Pullman fails to cure the deficiencies of Handley because Pullman fails to teach or suggest media for use in maintenance or prematuration and is limited to media for improving initiation (induction).

One of skill in the art with the teachings of Handley and Pullman would not have expected a combination of a galactose-containing sugar and an additional sugar in the maintenance or prematuration steps of somatic embryogenesis to be useful, much less that such a combination would produce such superior results. As discussed above, the use of a galactose-containing sugar and an additional sugar in the maintenance and prematuration stages yielded unexpected results which could not have been predicted from the teachings of Handley and Pullman. For example as shown in Example 10, the number of mature somatic embryos per gram of tissue was doubled when galactose was used in combination with an additional sugar for maintenance and prematuration of Douglas fir as compared to sucrose and maltose. Such a large

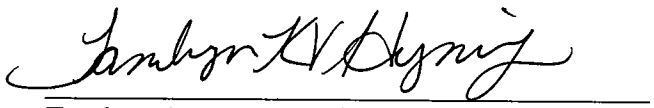
increase is clearly not predictable from the combination of Handley and Pullman. Claims 56-60 all depend from claim 55 and are not obvious over the combination of Handley and Pullman for at least the same reasons as stated for claim 55. Applicants respectfully request that the rejection be withdrawn.

Conclusion

Accordingly, Applicants respectfully request withdrawal of the rejections and allowance of the claims. The Examiner is encouraged to contact the undersigned by telephone at the Examiner's convenience should any issues remain.

Respectfully submitted,

Date: December 22, 2008



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